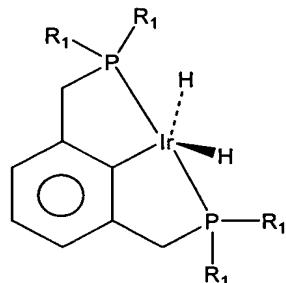


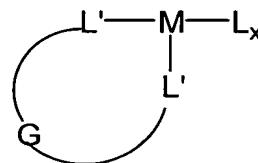
I claim:

1. A process which comprises polymerizing an olefin in the presence of: (a) a single-site or Ziegler-Natta olefin polymerization catalyst; (b) a low-temperature, platinum-group dehydrogenation catalyst; and (c) an optional hydrocarbon solvent, under conditions effective to promote:
 - (i) olefin polymerization;
 - (ii) catalytic dehydrogenation of the solvent and/or the resulting saturated oligomer or polymer chains to produce short and/or long-chain alkenes; and
 - (iii) copolymerization of additional olefin with the alkenes; to produce a polyolefin having long-chain branching and/or a density less than about 0.96 g/cm³.
2. The process of claim 1 wherein the low-temperature dehydrogenation catalyst contains a transition metal selected from the group consisting of nickel, palladium, platinum, iridium, rhodium, ruthenium, and rhenium.
3. The process of claim 2 wherein the transition metal is iridium.
4. The process of claim 1 wherein the dehydrogenation catalyst is a pincer complex.
5. The process of claim 4 wherein the dehydrogenation catalyst has the general structure:



in which each R₁ is independently a C₁-C₃₀ hydrocarbyl radical.

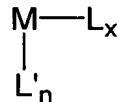
6. The process of claim 1 wherein the olefin polymerization catalyst comprises an activator and an organometallic complex, wherein the organometallic complex comprises a Group 3 to 10 transition metal, M, and at least one polymerization-stable anionic ligand that is bonded to M.
7. The process of claim 6 wherein the organometallic complex has open architecture.
8. The process of claim 6 wherein the organometallic complex has the general structure:



wherein M is a Group 3 to 10 transition metal; each L is independently selected from the group consisting of halide, alkoxy, aryloxy, siloxy, alkylamino, and C₁-C₃₀ hydrocarbyl; each L' is independently selected from the group consisting of alkylamido, substituted or unsubstituted cyclopentadienyl, fluorenyl, indenyl, boraaryl, pyrrolyl, azaborolinyl, and indenoindolyl; G is a linking group and x satisfies the valence of M.

9. The process of claim 8 wherein G is a divalent radical selected from the group consisting of hydrocarbyl and heteroatom-containing alkylene radicals, diorganosilyl radicals, diorganogermanium radicals, and diorganotin radicals.
10. The process of claim 9 wherein one L' is alkylamido and the other L' is selected from the group consisting of substituted or unsubstituted cyclopentadienyl, fluorenyl, indenyl, and indenoindolyl.
11. The process of claim 6 wherein the polymerization-stable anionic ligand is selected from the group consisting of cyclopentadienyl, indenyl, fluorenyl, and indenoindolyl ligands.

12. The process of claim 6 wherein the Group 3 to 10 transition metal is a Group 4 transition metal.
13. The process of claim 6 wherein the activator is selected from the group consisting of alumoxanes, alkylaluminum compounds, organoboranes, ionic borates, ionic aluminates, aluminoboronates, and mixtures thereof.
14. The process of claim 6 wherein the organometallic complex has the general structure:



wherein M is a Group 3 to 10 transition metal; each L is independently selected from the group consisting of halide, alkoxy, aryloxy, siloxy, alkylamino, and C₁-C₃₀ hydrocarbyl; each L' is independently selected from the group consisting of alkylamido, substituted or unsubstituted cyclopentadienyl, fluorenyl, indenyl, boraaryl, azaborolinyl, and indenoindolyl; n is 1 or 2 and x satisfies the valence of M.

15. The process of claim 1 wherein the olefin is selected from the group consisting of ethylene, propylene, 1-butene, 1-pentene, 1-hexene, 1-octene, and mixtures thereof.
16. The process of claim 1 wherein the olefin is ethylene.
17. The process of claim 1 wherein the polymerization is performed at a temperature within the range of about 30°C to about 250°C.
18. The process of claim 1 wherein the polymerization is performed at a temperature within the range of about 30°C to about 160°C.
19. A gas-phase, slurry, or solution process of claim 1.
20. A polyolefin made by the process of claim 1.
21. The polyolefin of claim 20 wherein the olefin consists essentially of ethylene.